1. Project Name: Manele SBH

2. Date of Inspection: April 6, 2007

3. Inspection Personnel:

Name	Agency/Office	Telephone No.
a. Dan Meyers	CEPOH-EC-T	438-8875
b. Maj. Robert Kroning	CEPOH-DD	438-1069

4. Discussion:

The breakwater has poor contact and armor sizing throughout the structure. This breakwater is not typical of the keyed and fitted construction used on other POH projects. The construction style is more of the random dumped armor stone type.

Maintenance dredging was completed May 2005. A fiber optic cable (owned by Pacific LightNet Communications) was located in the entrance channel and portions of entrance channel dredging were omitted from the contract.

New deficiencies were noted on this inspection and are indicated. The Oceanside (OS) of the structure at Sta. 4+95 thru Sta. 5+70 has dramatic changes this inspection and has deteriorated drastically.

Conducted site inspection and noted the following

a. Overview at start of the existing Stub Breakwater from trunk to root. Ocean side is to the right, and harbor side is to the left.

b. Overview at end of project from trunk to head. Ocean side is to the right, and harbor side is to the left.

c. Sta. 1+32, HS, dislodged armor stone 3’ from toe. Void is half way up side slope.

d. Sta. 1+39, OS, dislodged armor stone w/ voids, lower sideslope failure. Additional settling at sideslope this year.

e. Sta. 1+61, OS, sideslope failure. 8 LF hinge to toe under layer exposed. Additional settling at sideslope this year.

f. Sta. 1+66, HS, Sideslope settling, additional settling at sideslope this year.

g. Sta. 1+68, Crest settling, new this year.

h. Sta, 2+10, Hinge movement, new this year. Additional settling at sideslope this year.

WHITE CROSS at Sta. 2+25

i. Sta. 2+29, OS, 2 flipped armor stones on side slope.

j. Sta. 2+36, Previous inspection was void at crest, new deficiencies is OS, sideslope failure.

k. Sta. 2+51, OS, side slope steepening. Void under side slope. Under layer not exposed.

l. Sta. 2+44, Crest settling, new this year.

m. Sta. 2+40 to Sta. 2+70, OS, toe creep & sideslope settling (Bulge).

n. Sta. 3+01, OS, 1 armor stone resting at hinge, bridging.

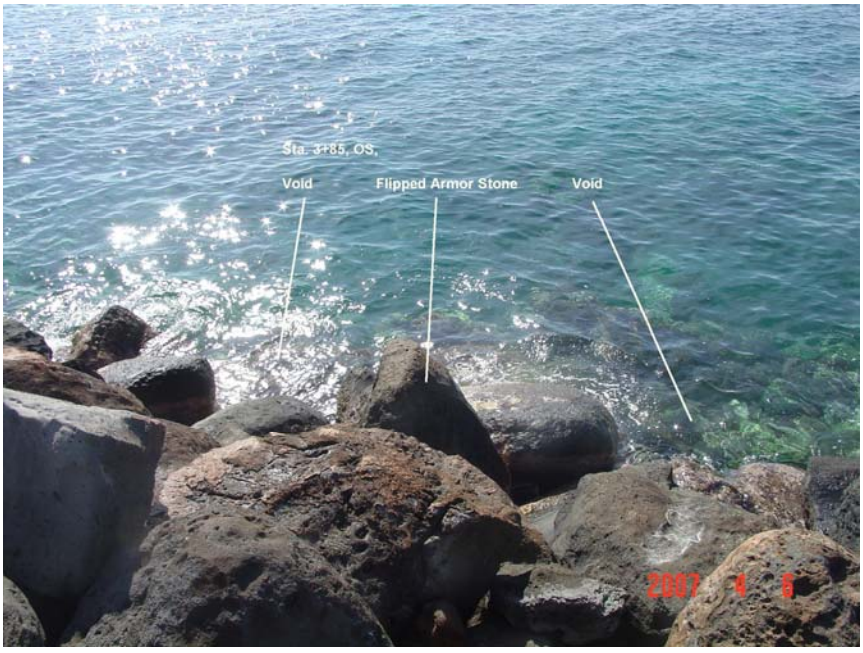
o. Sta. 3+07, Void centerline of crest, new this inspection, adjacent white cross.

p. Sta. 3+09, HS, dislodged armor stone at the toe.

WHITYE CROSS AT STA. 3+10

q. Sta. 3+40, 2 large voids at center line of crest. No Change.

r. Sta. 3+27 to Sta. 3+61, HS, sideslope failure.



s. Sta. 3+85, OS, 2 voids, 1 flipped armor stone.

t. Sta. 3+88 to Sta. 4+20, HS, sideslope setting.

u. Sta. 4+10, OS, 1 crack armor stone at hinge with void.

v. Sta. 4+22, OS, 1 armor stone dislodged resting on side slope, 1 fractured armor stone, void at waterline.

w. Sta. 4+42, HS, flipped armor stone.

x. Sta. 4+45, OS, hinge, void.

White Cross @ Sta. 4+58

y. Sta. 5+05 to Sta. 5+75, HS, sideslope settling at hinge to waterline.

z. Sta. 5+07 to Sta. 5+75, OS, sideslope steepening and settling at hinge to waterline.

aa. Sta 5+70, crest settling under NavAid foundation.

bb. Reference Photo, Head to Root OS.

cc. Non-Federal Parking Lot improvements at harbor.

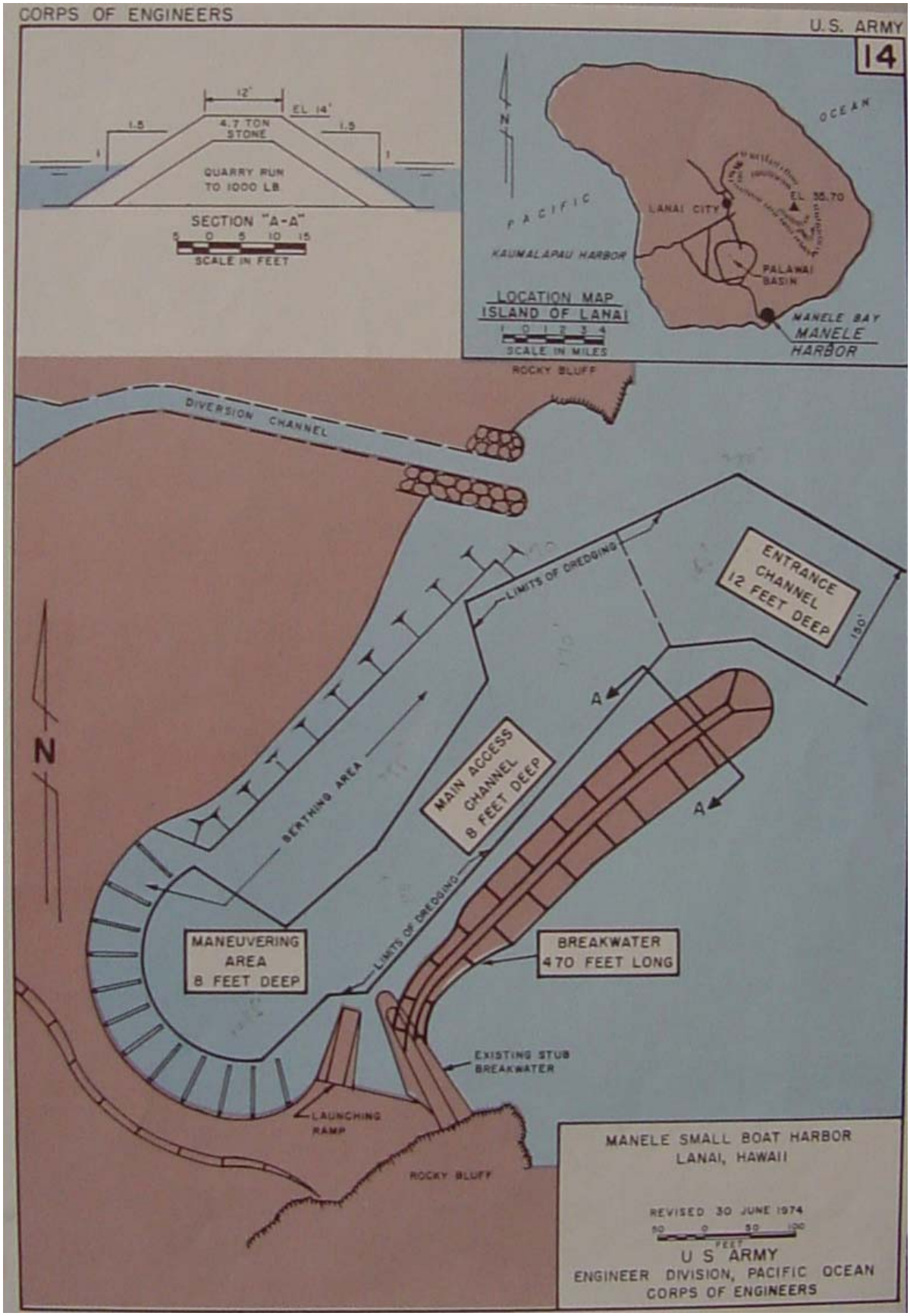
5. Conclusion:

After review of the past O&M inspections it appears the project was constructed with "extreme" randomness with respect to the armor stone placement and the noted items, while not the result of wave energy, are being exacerbated by wave action. The armor stones are not keyed and fitted resulting in loose and undersized which cause rocking. The lack of interlocking stones has created large voids, bridging, perched rocks, and exposed under layers and cores to direct wave action. The past photos reveal a steady decline in the contact of the armor stones. There has been a significant change in Sta. 4+95 to Sta. 5+70, OS, this year.

Signed: _____
Dan Meyers, CEPOH-EC-T

Signed: _____
James Pennaz, P.E., Ch, CEPOH-EC-T

Enclosure(s)
1. Site Plan (8½"x11")
2. Fact Sheet Dated June 2002 (8½"x11")


CORPS OF ENGINEERS
U.S. ARMY
14
12'
EL 14'
1.5
4.7 TON STONE
1.5
QUARRY RUN TO 1000 LB
SECTION "A-A"
SCALE IN FEET
N
OCEAN
PACIFIC
LANAI CITY
EL 35.70
KAUMALAPAU HARBOR
PALAWAI BASIN
LOCATION MAP
ISLAND OF LANAI
SCALE IN MILES
MANELE BAY
MANELE HARBOR
ROCKY BLUFF
DIVERSION CHANNEL
LIMITS OF DREDGING
ENTRANCE CHANNEL 12 FEET DEEP
150'
A
A
MAIN ACCESS CHANNEL 8 FEET DEEP
BERTHING AREA
N
MANEUVERING AREA 8 FEET DEEP
LIMITS OF DREDGING
BREAKWATER 470 FEET LONG
EXISTING STUB BREAKWATER
LAUNCHING RAMP
ROCKY BLUFF
MANELE SMALL BOAT HARBOR
LANAI, HAWAII
REVISED 30 JUNE 1974
FEET
U S ARMY
ENGINEER DIVISION, PACIFIC OCEAN
CORPS OF ENGINEERS

MANELE SMALL BOAT HARBOR, LANAI, HAWAII

CONDITION OF IMPROVEMENT 30 SEPTEMBER 1989

PREVIOUS PROJECTS: None.

EXISTING PROJECT: Authorized on 6 May 1963 under Section 107 of the River and Harbor Act of 1960. Provides for extension of an existing 100-foot long stub breakwater with a 470-foot rubblemound breakwater with crest elevation of 14 feet at the head and 6 feet at the root; an entrance channel 12 feet deep; and a main access channel and maneuvering areas, 8 feet deep.

PROGRESS OF WORK

Completed and Under Maintenance: The project was completed in December 1965. Last maintenance dredging was completed in December 1985; total material dredged was 2,000 cubic yards.

Work Remaining: None.

COST OF CONSTRUCTION:

Completed Works:	New Work	Maintenance	Total
United States Funds	$353,000	$423,622	$ 776,622
Contributed Funds			
Required	370,845	0	370,845
Other	5,446	11,735	17,181
Total Costs	$729,291	$435,357	$1,164,648

RANGE OF TIDES: The range of tide between mean lower low water and mean higher high water is 1.8 feet. The extreme range is 4.0 feet.